

Solid Earth

ES-3 The student will demonstrate an understanding of the internal and external dynamics of solid Earth.

ES-3.5 Analyze surface features of Earth in order to identify geologic processes (including weathering, erosion, deposition, and glaciation) that are likely to have been responsible for their formation.

Taxonomy level: 4-B Analyze Conceptual Knowledge

Previous/future knowledge: Students in 5th grade (5-3.1) explain how natural processes of weather erosion, and deposition affect Earth's oceans and land in constructive and destructive ways. In 8th grade (8-3.9) students identified and illustrated geologic features as viewed using imagery and topographic maps. Students have not been introduced the process of glaciation nor its resulting features.

It is essential for students to use illustrations, imagery, topographic maps, pictures, or descriptions of surface features to determine geologic processes responsible for those features.

Weathering is a process that includes both the disintegration and decomposition of surface rock material.

- *Disintegration* is the physical or mechanical breakdown of Earth materials; the original material has not been changed, just its size or shape. Rocks may be cracked, broken, or peeled off through mechanical weathering.
- *Decomposition* is the chemical altering of the composition of the material. Acids, water, carbon dioxide, or oxygen may react with the rock material causing the change.

Erosion is a process that moves weathered material from one place to another.

- Various erosion agents (gravity, wind, water, plants/animal/humans) pick up Earth materials and carry them to other locations.
- Erosion is a destructive process that wears down Earth's surface.
- Gullies, rills, changes in coastal topography, sand dunes, and landslides are evidence of erosion by those various agents.

Deposition is a process is closely related with erosion because they are dependent on one another.

- The agent that eroded the material in one place will deposit it in another.
- It is a constructive process that builds up Earth's surface.
- Deltas and sandbars or barrier islands are a result of deposition.

Glaciation is a process has the capacity to carry huge rocks and piles of debris over great distances.

- Glaciers scrape and gouge out large sections of Earth's landscape.
- Features left in the wake of glaciation include U-shaped valleys, waterfalls, glacial lakes, and various types of deposits such as moraines.

It is not essential for students to know the names for individual processes of weathering, erosion, or glaciation – just the broad concepts.

Assessment Guidelines:

The objective of this indicator is to *analyze* surface features of Earth to identify the geologic processes responsible for their formation; therefore, the primary focus of assessment should be to determine from material presented the relevant information that would determine the cause for a particular geologic feature or the change that occurred to a geologic feature.

In addition to *analyze* appropriate assessments may require students to:

- *compare* the processes of weathering, erosion, and deposition;
- *summarize* the processes that change the surface features of Earth; or
- *identify* features of glaciation.